SUCCESSFUL COMMISSIONING STRATEGIES FOR RESEARCH BUILDINGS

OVERVIEW

Commissioning has become an important part of the project delivery system for complex technologically advanced research buildings.

In this poster presentation, Watkins Hamilton Ross /ccrd partners will illustrate how to integrate a research building's components and systems into a project Commissioning Plan, identify procedures and protocols for testing and verifying systems, resolve failure to operate provisions when encountered, and outline techniques for selecting a Commissioning Agent (CA). The University of Texas at Austin Biological Science – Wet Lab Building, currently under construction with a detailed commissioning plan, will be used to demonstrate the process, procedures and protocols, and provide examples of documents that should be used for a state-of-the-art research facility.

COMMISSIONING PROCESS

WHAT IS COMMISSIONING

Commissioning is a systematic, comprehensive and dynamic process of ensuring that all building systems perform interactively according to the design intent and the client's project requirements and operational needs.

The commissioning services process follows a logical sequence of testing, verifying and documenting the installation and proving of components, equipment and ultimately integrated structural, architectural, electrical and mechanical systems to ensure design intent and operational requirements are met.

COMMISSIONING TEAM STRUCTURE

WHO IS THE TEAM

The process starts with education and integration of the commissioning team including representatives of the user, owner, architect / engineer, construction manager and consultants as to the goals and procedures of commissioning. Development of the Commissioning Plan as part of the contract documents through design phase can then become a collaborative effort that reflects priorities of all parties. Contractors, vendors and suppliers must also "buy in" to the process prior to start of construction. This creates an atmosphere of cooperation and joint ownership in the success of the commissioning effort.

PROCEDURES AND PROTOCOLS

DESIGN PHASE

As the Commissioning Plan is developed during the design phase, specific and detailed checklists should be created for the various systems to be commissioned. Data for developing check lists is readily available from experienced commissioning agents. Working together the architect and engineer, construction manager and the owner's operations and maintenance personnel, will review and refine these checklists during design so that the appropriate level of effort is accurately reflected in these documents for subsequent use during construction.

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PROCEDURES AND PROTOCOLS *continued*

The Commissioning Team then implements the process during the construction phase and represents a partnership between the parties that will result in a fully documented facility that performs in accordance with design intent and the operational needs of the user and owner. A well-executed Commissioning Plan enables quality control to be performed throughout the construction phase which will result in a shorter project closeout period, allowing the user to occupy the facility sooner.

COMMISSIONING PLAN

IMPLEMENTATION - CONSTRUCTION PHASE

Commissioning activities on The University of Texas at Austin, Biological Science - Wet Lab Building had begun during the programming phase of the project, continued during the design phase and are currently proceeding through the construction and subsequent warranty period (typically one year following occupancy).

The Commissioning Agent organization and structure must maintain a capability such that the principals in the firm commit to be actively involved in the projects.

To provide a high level of service, it is extremely important that the personnel in the project team maintain continuing involvement from project inception, through project design, construction and project commissioning, project closeout and client occupancy. A great volume of data that has to be processed requires permanent attention.

The following tests are scheduled for building components and systems:

Pre-Functional Test: Review of shop drawings, material samples, submittal data and manufacturer certifications/tests for conformance to specifications and design intent.

Functional Test: Verification of the installation of a piece of equipment, device or apparatus for proper operation either as a stand-alone entity or subsystem of a more complex system.

Integrated System Test: Verification of the installation of a series of equipment, devices, or apparatus as a complete and working system or subsystem.

The test types are divided into four categories:

P = *Passive*-Requires data review and/or observation
A = *Active*-Requires test apparatus and direct contractor participation in a test procedure
C = *Certified*-Requires third party certification
O = *Owner Performed*

RESOLVING FAILURE-TO-OPERATE (FTO) PROBLEMS

First, FTO should not be encountered if the commissioning process has thoroughly been planned and implemented for the project. "Trust but verify" is extremely important – human mistakes are preventable.

Should, however, an FTO condition arise, the CA and team must utilize a proactive communication process whereby the root cause of a problem is quickly identified and a remedy sequence is put in place. Input should be received from all stake holders and processed in a team session, then a plan of action should be implemented. Follow-up takes place by both design/construction team, quality control team, and the owner representatives.

RESOLVING FAILURE-TO-OPERATE (FTO) PROBLEMS *continued*

Lessons learned are then gathered from all participants and put in place for future use. In most cases, FTO resolution is best handled face-to-face. It is most important the Commissioning Team forges a working relationship with all contracting parties so that there is no barrier to communicating positively and professionally during problem resolution.

Similarly, the use of partnering sessions with the design/construction team can provide assistance and benefit in breaking down communication barriers if implemented early in the design and construction process.

PROCESS FOR SELECTING AND MANAGING THE COMMISSIONING AGENT (CA)

WHO

Different approaches as to who should be selected as the CA?

The CA is heavily weighted toward extensive field experience in installing and testing MEP systems and general construction. An understanding of the design process is important. A technically capable firm with several qualified individuals' participation is essential.

WHAT

In what activities is the CA expected to participate?

Decide what activities the CA is expected to participate in. The decision is based in part on systems complexity, contractor experience, Owner's staff qualifications, project schedule and budget (project scope definition skills are needed). The integrated process starts day one, in program and document reviews.

WHEN

When should the CA become involved?

It is best to start early, during project programming or early in the design phase; however, the latest practical time to contract the CA is shortly after the construction contract has been awarded. Early involvement allows the CA to review schedules, submittals and testing programs developed by the contractor.

HOW

What is the process for soliciting and selecting the right CA for your project?

Before soliciting your CA there are several approaches in the commissioning process to consider. These include: Independent , Designer, Contractor, Owner and Multi-party.

Independent Commissioning Agent has a fresh, "unbiased" look at the project, its needs and possible short falls. Unless he is on-board from the project inception, his familiarity with the project evolution is less thorough.

Designer as Commissioning Agent has a thorough, in-depth understanding of the project and its issues but may be too close to the project to recognize some possible short falls.

Contractor as Commissioning Agent. The lines of responsibility between construction and commissioning, may be somewhat blurred.

Owner as Commissioning Agent. If the team is qualified and experienced, the process may be streamlined due to intensive Owner representation.

Multi-Party Commissioning Agent. Coordination of multiple organizations and their team members is crucial to the efficient commissioning process.

PROCESS FOR SELECTING AND MANAGING THE COMMISSIONING AGENT *continued*

Solicitation Process

A Request for Qualification (RFQ) is the most common way to solicit a CA. An RFQ advertisement should identify the nature (research facility, laboratory, etc.) of the construction project to be commissioned and types of systems to be commissioned. Identify skills and experience needed.

Obtain the following

- Company History
- Company Experience and Capability
- Financial Resources
- Local Experience in certain time period (3-5 yrs) on projects similar in size and scope
- Resumes of key people and their commitment to the project
- Project Management Capabilities
- References

Schedule interviews for finalists

Check comprehensive documents evidence of prior experience (schedules, protocols, test procedures)

Evaluate the fee proposal

In conclusion, the success of the project will depend on selecting the right team. The CA in particular plays a significant role in ensuring that all building systems perform interactively according to the design intent and the client's project requirements and operational needs. A systematic CA selection process is therefore of utmost importance.

University of Texas at Austin,
Biological Science Wet Lab Building
Austin, Texas

Construction Progress, July '03